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THE TWO EVENTS of scientific interest in New York at this time are the judicial investigation into the possibility of killing a human being by electricity without inflicting torture, the death to be instantaneous, and the progress of the arrangements for the world's fair to be held here in 1892. At the electrical hearing, all shades of opinion have been expressed by those called upon to testify. By some it is maintained that death is by no means sure to follow the application of currents of high potential, that the action of the electricity is liable to be erratic, and that the attempt to put to death by electricity the criminal now under sentence may lead to unlawful torture. By others, including Mr. Edison, it is testified that death will be sure and painless on applying the strong electric currents proposed. The exhibition plans have progressed to the stage of a meeting of prominent citizens at the mayor's office, for a discussion of preliminaries. The daily papers of this city, as well as many of the more prominent ones of other cities, have taken up the subject energetically, and appear to be unanimously in favor of the project. One or two of the larger Western cities seem to think that the proper place for such an exhibition would be at one of the great cities of the West, somewhere nearer the centre of the continent than New York; but the general consensus of opinion seems to be that the metropolis of the continent is the place at which to fitly celebrate the four hundredth anniversary of that continent's discovery.

ANTS.

IN the second bulletin issued by the Hatch Experiment Station of the Massachusetts Agricultural College, an account was given of experiments made for the destruction of ants in lawns and walks, but no methods were given for those that find their way into houses, and become an intolerable nuisance because of their desire for sugar and other sweets. These are more frequently the small species, but what they lack in size they usually make up for in numbers. Mr. C. H. Fernald is inclined to the opinion that they enter the houses and discover the coveted articles by chance; that their scouts, in exploring, find these articles, not by keen sight or smell, but by mere accident. When one has found some choice dainty, she (these wingless workers are undeveloped females, not neuters as some have supposed) sips her fill, and at once starts for home, where by some means she communicates the information of the locality of untold treasures to others, which return with her; and they, in turn, appear to spread the information on their return home; and soon the throngs that come and go are sufficient to disturb the most amiable of housekeepers. Various remedies have been suggested, one of which is to draw a chalk-mark on the floor around the sugar-barrels or other articles to be protected from them. It is undoubtedly true that ants travel in a regular beaten track, as it were, by the sense of smell; and, if this be removed from the ground over which they travel, they are at a loss, and often wander around for some time before they find the trail again. They may be thrown off the trail by drawing a chalk-mark or even the finger across it. This is only a temporary protection, however; for sooner or later they will find their way across, and then travel goes on as uninterruptedly as before.

It has been recommended to sprinkle sugar into a sponge and place it in their path, and, as it fills up with ants several times a day, immerse it in hot water to kill those adhering to it. This will undoubtedly prove successful if carefully followed up for some time; but, when we remember that the females are constantly laying eggs to produce workers which will take the places of those already destroyed, the task seems almost hopeless.

There can be no doubt that a better method would be to follow the ants carefully, and discover, if possible, where their nest is, and then destroy the entire community by making one or more holes down through the nest, and then pouring in a teaspoonful of bisulphide of carbon, carefully stamping down the ground afterwards to close the holes. The fumes of this substance will penetrate the nest in all directions, and destroy the entire community.

COLIC OF HORSES.

BULLETIN No. 2, Vol. II., of the Ohio Agricultural Experiment Station, is a comprehensive treatise on colic of horses, by Dr. H. J. Detmers, the veterinarian of the station.

It begins with a brief introduction, and a definition of what is understood by the term "colic," showing that the same is applied, not to a single disease, but to quite a number of morbid processes which have their seat in the digestive canal, and produce violent manifestations of pain. It then dwells at length on the various causes, and not only explains their action, or their effect upon the animal organism, but also draws attention to formerly overlooked facts, which throw light upon the origin of many cases of colic and the morbid processes of the same, which cannot be accounted for in any other way. It fully and comprehensively describes the symptoms, gives all the data necessary for the diagnosis and prognosis, and finally, in plain language, maps out a rational treatment, which is simple enough to be understood by everybody, and easy enough of application to be executed by any intelligent person. One plate illustrating the cause of certain morbid changes peculiar to horses and mules, and predisposing the same to the most frequent of these diseases, usually called colic, accompanies the treatise.

In the "Fifth Annual Report of the Ohio Agricultural Experiment Station" for 1886 (pp. 296–303), Dr. Detmers published a brief article on the causes of colic of horses. He then stated that his observations had confirmed Professor Bollinger's assertion that nearly every aged horse has an aneurism (a soft, pulsating tumor in an artery) in the anterior mesenteric artery, that such an aneurism is produced by the presence of a small worm (*Sclerostomum*

equinum) belonging to the family of *Strongylidæ*, and that in many, perhaps in a majority of cases, the existence of such an aneurism must be considered, if not the sole, at any rate the principal, cause of colic.

Although not much that is really new can be added to what was said in the annual report of 1886, and although no important discoveries have since been made, the simple fact that since that report was published such an aneurism has been found in every one of the sixteen horses that have been killed for anatomical purposes in the Veterinary College, or Veterinary Department of the Ohio State University, and that said aneurism was found not only in old horses, but also in young horses and in mules, will more than corroborate what was said two years ago, and be of interest to science, and of practical value to the farmer and horse-owner. As to the occurrence of the aneurism in young horses, Dr. Detmers states, that, among the sixteen horses and mules killed for anatomical purposes since the publication of the fifth annual report, were two young horses (one last year, and one this winter) which were each less than two years old, consequently mere colts, and that both had big aneurisms containing quite a large number of worms.

As colic is one of the most frequent diseases of horses, which, notwithstanding its frequent occurrence, is but little understood even by the majority of veterinarians, and consequently a disease which is seldom rationally treated, and perhaps oftener than any other a subject of quackery of the grossest kind; further, as it causes every year great losses, partially due to its often dangerous character, and partially to irrational treatment, — this brief treatise on colic, showing the causal connection between the aneurism and the morbid process, explaining its true causes, describing the symptoms, etc., giving a rational treatment, and pointing out the means of prevention, will be appreciated by farmers and horse-owners.

As to colic, it will, on the whole, be easier to ward off or to prevent the exciting than the predisposing causes. A prevention of the principal and most frequent exciting causes will be effected if the horse is always regularly fed; if the food is sound, wholesome, and digestible; if feeding a heavy meal immediately before and immediately after severe exercise is avoided; if no food that has a tendency to ferment, or that is rich in alkalies, is given; if the feeding of new grain and of new hay that has not yet passed through the so-called "sweating process" is avoided, or, where that cannot be done, if such new hay and new grain are fed only in small quantities, and then with a small pinch of salt added to each meal; if no icy food, or food covered with hoar-frost, is allowed to be eaten; if no ice-cold water is given to drink, or, when it cannot be avoided, only in small quantities, and never when the horse is perspiring or has an empty stomach; and, finally, if meal or bran that may be used as food is never given until it has been thoroughly moistened.

The principal predisposing cause, according to Dr. Detmers,— the aneurism in the anterior mesenteric artery, — can be warded off by preventing the worm-brood of *Sclerostomum equinum* from entering the digestive canal of the horse; but this, it seems, can only be accomplished if the horse is never allowed to drink any water but what is positively free from the worm-brood. That this will be difficult, will not need any explanation.

This bulletin will be sent free to any resident of Ohio on application to the Ohio Agricultural Experiment Station, Columbus, O.

QUARTZ FIBRES.

IN almost all investigations which the physicist carries out in the laboratory, he has to deal with, and to measure with accuracy, those subtle and to our senses inappreciable forces to which the so-called laws of nature give rise. Whether he is observing by an electrometer the behavior of electricity at rest, or by a galvanometer the action of electricity in motion; whether in the tube of Crookes he is investigating the power of radiant matter, or with the famous experiment of Cavendish he is finding the mass of the earth, — in these and in a host of other cases he is bound to measure with certainty and accuracy forces so small that in no ordinary way could their existence be detected; while disturbing causes which might seem to be of no particular consequence must be eliminated, if his experiments are to have any value. It is not too much to say that the very existence of the physicist depends upon the power which he possesses of producing at will and by artificial means forces against which he balances those that he wishes to measure.

The weight of a single grain is not to our senses appreciable, while the weight of a ton is sufficient to crush the life out of any one in a moment. A ton is about 15,000,000 grains. It is quite possible to measure with unfailing accuracy forces which bear the same relation to the weight of a grain that a grain bears to a ton.

To show how the torsion of wires or threads is made use of in measuring forces, simply hang a straw horizontally by a piece of wire. Rest on the straw a fragment of sheet-iron. A magnet so weak that it cannot lift the iron is able to pull the straw round through an angle so great that the existence of the feeble attraction is plainly evident.

Ordinary spun glass, a most beautiful material, is about one-thousandth of an inch in diameter, and this would appear to be an ideal torsion-thread. Owing to its fineness, its torsion would be extremely small, and the more so because glass is more easily deformed than metals. Owing to its very great strength, it can carry heavier loads than would be expected of it. It has every good quality but one, and that is its imperfect elasticity. For instance: if a mirror is hung by a piece of spun glass, and if you turn the mirror twice to the right, and then turn it back again, a ray of light reflected from the mirror does not come back to its old point of rest, but oscillates about a point on one side, which, however, is slowly changing, so that it is impossible to say what the point of rest really is. Further, if the glass is twisted one way first, and then the other way, the point of rest moves in a manner which shows that it is not influenced by the last deflection alone: the glass remembers what was done to it previously. For this reason spun glass is quite unsuitable as a torsion-thread. It is impossible to say what the twist is at any time, and therefore what is the force developed.

So great has the difficulty been in finding a fine torsion-thread, that the attempt has been given up, and in all the most exact instruments silk has been used. The natural cocoon fibres consist of two irregular lines gummed together, each about one two-thousandth of an inch in diameter. These fibres must be separated from one another and washed. Then each component will, according to the experiment of Gray, carry nearly 60 grains before breaking, and can be safely loaded with 15 grains. Silk is therefore very strong, carrying at the rate of from 10 to 20 tons to the square inch. It is further valuable in that its torsion is far less than that of a fibre of the same size of metal, or even of glass, if such could be produced. The torsion of silk, though exceedingly small, is quite sufficient to upset the working of any delicate instrument, because it is never constant. At one time the fibre twists one way, and another time in another, and the evil effect can only be mitigated by using large apparatus in which strong forces are developed. Any attempt that may be made to increase the delicacy of apparatus by reducing their dimensions is at once prevented by the relatively great importance of the vagaries of the silk suspension.

The result, then, is this: the smallness, the length of period, and therefore delicacy, of the instruments at the physicist's disposal, have until lately been simply limited by the behavior of silk. A more perfect suspension means still more perfect instruments, and therefore advance in knowledge.

As nothing that Mr. C. V. Boys, F.R.S., knew of could be obtained that would be of use to him, he was driven to the necessity of trying by experiment to find some new material. The result of these experiments was the development of a process of almost ridiculous simplicity.

The apparatus consists of a small cross-bow, and an arrow made of straw with a needle-point. To the tail of the arrow is attached a fine rod of quartz which has been melted and drawn out in the oxyhydrogen jet. The operator holds a piece of the same material in his hand, and, after melting their ends and joining them together, — an operation which produces a beautiful and dazzling light, — all he has to do is to liberate the string of the bow by pulling the trigger with one foot; and then, if all is well, a fibre will be drawn by the arrow, the existence of which can be made evident by fastening to it a piece of stamp-paper.